REMARKS/ARGUMENTS

Reconsideration and allowance of the subject application are respectfully requested.

Claims 1, 3-9, and 11-27 are pending in the application. Claims 1 and 24 are independent.

Claims 1, 3-5, 15 and 18-27 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent Application Publication Number US 2002/0100864 A1 ("Wake") in view of K.F. Kwong, et al., *400-Hz mechanical scanning optical delay line*, Optics Letters, Vol.18, No. 7, April 1, 1993, pp. 558-560 ("Kwong"). Applicant respectfully traverses all art rejections. The Examiner kindly indicated that Claims 9 and 11-12 contain allowable subject matter.

In making the above rejection the examiner has stated that Wake discloses many of the features of the rejected claims, but lacks any disclosure of a "temporal/optical delay." The Kwong reference is therefore cited as disclosing "the use of optical delay lines to display pulse autocorrelations... used for signal averaging measurements." The examiner thereafter concludes that it would have been obvious for one skilled in the art to modify the apparatus of Wake to incorporate the teachings of Kwong. However, there is no logical basis provided for this conclusion, nor is there any explanation given as to how the disclosures of the two references would have been combined.

The Wake reference has been discussed in a previous response, and those comments are incorporated herein. Wake operates in the same field as the applicant's invention, and collects optical signals that are used to determine temporal point spread functions (TPSFs). An electrical time-gating signal is used by Wake to sample a portion of each TPSF curve, and the samples are coupled to an integrator circuit. As clearly apparent from the Wake reference, all of the time-delay and time-gating functions are performed in the electrical domain.

The Kwong reference is a journal article from 1992 that is completely unrelated to the field of optical imaging. Kwong discloses a scanning optical delay line which may be used for pulse autocorrelation, an intended use that is acknowledged by

the examiner. Despite the vast difference in technological fields, however, the examiner has concluded that it would have been obvious to modify the apparatus of Wake to use the optical delay lines of Kwong "in order to optimize time gate TPSF data collection time."

The examiner's proposed prior art rejection is notably lacking in detail. First, it is not at all clear how one skilled in the art would have combined the apparatus of Wake with that of Kwong. Wake provides no suggestion of a need for optical delay lines, nor is there any structure mentioned that would allow the integration of such delay lines. Rather, the timing components of Wake operate in an electrical domain. The examiner has pointed out that Wake makes use of optical fiber cables, but seems to misinterpret the manner in which these cables function. In stating that Wake discloses that "desired temporal delays are introduced in propagation of the optical signals," the examiner cites Figure 9A. But Figure 9A shows only that there is a fixed propagation time for a laser pulse traveling through a non-attenuating medium (as mentioned in paragraph [0071] of Wake). There is nothing in Figure 9A even remotely related to the introduction of desired temporal delays in the propagation of an optical signal. The examiner continues by stating that the "temporal delays" are "to produce time-delayed TPSF's," this time citing "circuit 106" of Wake, which is an electrical component described as a "time delay circuit." Obviously, this has nothing to do with an optical time delay. There is no reason given for why one skilled in the art would therefore seek an optical delay line like that of Kwong.

The examiner has also stated that Wake teaches that "all of said selected time-gates are simultaneously detected," citing paragraph [0060]. However, this seems to be a misinterpretation of the Wake reference and, perhaps, a misunderstanding of the concept of time-gates. In the cited paragraph, Wake discusses the different detectors that are located in an orbit around a breast being imaged, and refers to the "simultaneous acquisition of data from all the detectors," but nowhere is it discussed to simultaneously acquire different time-gates from a given TPSF.

The concept of a time-gate may be understood by viewing Figure 2 of the applicant's disclosure. This figure shows a graphical depiction of a TPSF. As described in paragraph [0027] of the applicant's disclosure, "[i]n Figure 2 it can be seen that a

TPSF can be subdivided in *n* arbitrary intervals 8 which will be referred to as time-gates (tg) hereafter." That is, the "time-gates" are different segments along the temporal dimension of a TPSF. Thus, the simultaneous detection of multiple time-gates from a given TPSF requires the ability to detect different portions of a TPSF curve at the same time.

The detectors of Wake referred to by the examiner are each detecting a different TPSF signal. Each has a different location around the orbit, and each is collecting a TPSF data from a different spatial position. Since the detectors are all different, and all relate to different TPSFs, there is no apparent reason why the data from the different detectors could not be collected simultaneously. Moreover, there is no logical basis given for why this would benefit in any way from the use of an optical delay line like that of Kwong.

The present invention uses an optical delay mechanism to allow simultaneous detection of different time-gates of what is essentially the same TPSF. An example of how this might be accomplished is shown in Figure 4 of the applicant's disclosure. Optical signals are collected from several adjacent collection ports of an object of interest, and each optical signal is coupled into a different optical fiber. Each of the optical fibers delivers the optical signal to a different one of several adjacent detection positions on a gated-ICCD detector, but each fiber has a different overall length. As a result, the propagation time for each of the optical signals is different. Since the optical signals are TPSFs, at any given point in time, a different section, or time-gate, of the TPSF is reaching the detector at each of the different detection points. Thus, in one detector time window, different time-gates are detected, as shown graphically in Figure 5.

In the applicant's last response, Claim 1 was amended to recite collecting light from the object at a plurality of collection ports, and introducing a relative temporal delay *to the optical signal temporal point spread functions.* It is this relative *optical* delay that allows for the simultaneous detection of different time-gates. Since the TPSFs of Wake are from completely different detection points, there is no logical reason for applying a relative optical delay to the optical signals being collected. However, in the present invention, collection ports may be located directly adjacent to one another

such that the TPSFs are substantially identical (as recited in the applicant's Claim 2). In this case, the relative optical delay between the signals collected from the adjacent collection points allows for the simultaneous detection of different time-gates of the TPSF.

The examiner's prior art combination of Wake and Kwong falls short of suggesting the applicant's claimed invention in that there is no explanation how the two technologies might be combined. Perhaps more importantly, there is no logical basis provided for why one skilled in the art of Wake would ever look to Kwong, since there is no collection in Wake of substantially identical TPSFs, and no apparent interest in simultaneously detecting different time-gates from those TPSFs. In short, there seems to be no reason to even view the two references together without the hindsight knowledge provided by the applicant's disclosure and, even with such knowledge, a logical combination of the Wake and Kwong technologies is difficult to envision.

Claim 1, as currently presented, recites the introduction of a relative temporal delay to the optical signal temporal point spread functions collected at a plurality of collection ports. The claim also recites detecting at least one time-gate from each of the temporal point spread functions, wherein those gates are detected simultaneously. Similarly, independent Claim 24 recites a light collection apparatus that collects light from the object at a plurality of collection ports to provide a plurality of optical signal based temporal point spread functions, and an optical delay feature that creates a relative optical delay between the optical signal temporal point spread functions. Claim 24 further specifies that the one or more time-gated detectors detect at least one time-gate of each said temporal point spread function, and that those time-gates are detected simultaneously. There is no suggestion anywhere in the cited prior art of such a configuration. The introduction of the Kwong reference, which is from a completely unrelated technical field, adds nothing more than an example that relative optical signal delays are known in the context of a different technology. The lack of any nexus between Wake and Kwong is indicative of a hindsight reconstruction on the part of the examiner and, even when viewed together, there is no logical basis by which to combine the two technologies. Claims 3-5, 15 and 18-23 each depend ultimately from Claim 1, and Claims 25-27 each depend ultimately from Claim 24, and each of these

claims is therefore equally not suggested by the cited prior art. Reconsideration of Claims 1, 3-5, 15 and 18-27 under this ground for rejection is respectfully requested.

Claims 6-8 were rejected under 35 U.S.C. §103(a) as being obvious over Wake in view of Kwong, and in further view of U.S. Patent No. 5,692,511 ("Grable"). In making this rejection, the examiner has stated that Wake and Kwong together teach all of the limitations of the rejected claims with the exception of the basis for selecting time-gates. The Grable reference has therefore been cited as disclosing the use of measurement criteria, including the properties of light and thickness of the desired medium to be measured. Without commenting on the applicability of Grable in this regard, it is noted that the combination of Wake, Kwong and Grable fails to suggest the invention of Claim 1 for the reasons provided above with regard to the combination of Wake and Kwong. Since each of Claims 6-8 depends ultimately from Claim 1, each of these claims is therefore equally not suggested by the cited prior art combination. Reconsideration of Claims 6-8 under this ground for rejection is respectfully requested.

Also, Claims 13-14 and 16-17 were rejected under 35 U.S.C. §103(a) as being obvious over Wake and Kwong in view of U.S. Patent Application Publication No. US 2002/0067901 ("Mukherjee"). In making this rejection, the examiner has stated that Wake and Kwong teach all of the limitations of the rejected claims except for the use of an ICCD camera. Mukherjee is therefore cited as showing the use of such a camera as a fast time-gated camera. Without commenting on the applicability of the Mukherjee reference in this regard, it is noted that the combination of Wake, Kwong and Mukherjee fails to suggest the invention of Claim 1, as amended, for the reasons provided above with regard to the combination of Wake and Kwong. Since each of Claims 13-14 and 16-17 depends ultimately from Claim 1, each of these claims is therefore equally not suggested by the cited prior art. Reconsideration of Claims 13-14 and 16-17 under this ground for rejection is respectfully requested.

In view of the above, it is believed that this application is now in condition for allowance, and a Notice thereof is respectfully requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 625-3507. All correspondence should continue to be directed to our address given below.

Respectfully submitted,

/Richard P. Bauer/
Richard P. Bauer
Attorney for Applicants
Registration No. 31,588

Patent Administrator
Katten Muchin Rosenman LLP
East Lobby, Suite 700
1025 Thomas Jefferson Street, N.W.
Washington, D.C. 20007
Facsimile: (202) 298-7570